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(71) Applicant: **MITSUBISHI DENKI KABUSHIKI KAISHA**
2-3, Marunouchi 2-chome Chiyoda-ku
Tokyo 100(JP)

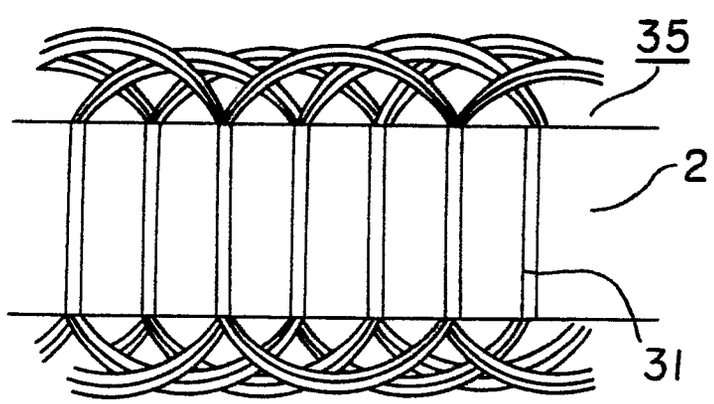
(72) Inventor: **Taji, Ryoichi**
2-3, Marunouchi 2-chome
Chiyoda-ku Tokyo(JP)
Inventor: **Imori, Hideo**
2-3, Marunouchi 2-chome
Chiyoda-ku Tokyo(JP)

(74) Representative: **Liesegang, Roland, Dr.-Ing.**
Sckellstrasse 1
D-8000 München 80(DE)

(54) **Armature of an a.c. generator for a car and method of manufacturing the same.**

(57) An armature of an a.c. generator for a car comprising a stator core (2) provided with a number of slots (21) and stator coils fitted in the slots wherein about a half in number of coil elements (20a,20b) of each radially extending portion of the stator coils received in the slots is received in the other slots.

FIGURE 7



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ARMATURE OF AN A.C. GENERATOR FOR A CAR AND METHOD OF MANUFACTURING THE SAME

The present invention relates to an armature of an a.c. generator for a car and a method of manufacturing the armature.

Figures 1 and 2 show steps of a conventional method of manufacturing the armature and Figure 8 shows an important part of the conventional armature.

In the figures, a reference numeral 1 designates a coil element; a numeral 10 designates a coil unit formed by winding in a circular form the coil element 1 in the number of turns required to form a single phase; and a numeral 20 designates a coil member formed by shaping the coil unit by using a shaping machine (not shown) into a ring form in which a plurality of raising and sinking portions are alternately formed in the radial direction.

Figure 3 shows a stator core 2 provided with a number of slots 21.

Figure 8 shows a part of a stator assembly 30, in a developed form, of the conventional armature, in which the coil members 20 are fitted in the slots of the stator core 2. A numeral 31 designates coil ends.

In the conventional armature for the a.c. generator, the stator assembly 30 is formed by inserting each portion of the coil member 20 extending in the radial direction in each of the slots 21 of the stator core 2. In this case, coil ends 31 lead out from one slot are bundled together and have the same direction to be introduced another slot. Accordingly, when the coil member 20 is inserted in the slots 21 of the stator core 2 at a high occupation rate, it is difficult to insert the coil member 20 without increasing the height of projection of the coil ends 31 above a side surface of the stator core 2. Further, since the coil member constitutes a single phase, cooling property of the coil ends 31 is deteriorated.

It is an object of the present invention to eliminate the disadvantage of the conventional armature and to provide an armature for an a.c. generator for a car which reduces the height of the coil ends even though an occupation rate of the stator coil is increased with respect to the slots of the stator core, and improves cooling properties.

The present invention is to provide an armature of an a.c. generator for a car comprising a stator core provided with a number of slots and stator coils fitted in the slots, characterized in that about a half in number of coil elements of each radially extending portion of the stator coil received in the slots is received in the other slots.

Further, the present invention is to provide a method of manufacturing an armature of an a.c. generator for a car characterized in that a stator coil formed by shaping a coil element in a multi-wound ring-shape, in which a number of raising and sinking portions are alternately formed in the radial direction; is splitted into two multi-wound ring-shape stator coils with electrical connection between them; either one of the two multi-would ring-shape stator coils is 180° reversed; two splitted stator coils are overlapped so that each of the raising portions of either of the splitted stator coils corresponds to each of the sinking portions of the other splitted stator coils; and the splitted stator coils are fitted into slots formed in a stator core.

In drawings;

Figures 1 and 2 are diagrams showing steps of manufacturing a coil member in a conventional method;

Figure 3 is a perspective view partly broken of a typical stator core;

Figures 4 and 5 respectively diagrams showing steps of manufacturing a stator coil according to an embodiment of the present invention;

Figure 6 is a plane view of a stator coil formed by the steps shown in Figures 4 and 5;

Figure 7 is a diagram in a developed form of an embodiment of the armature for an a.c. generator for a car according to the present invention; and

Figure 8 is a diagram in a developed form of a conventional armature.

An embodiment of the present invention will be described wherein the same reference numerals designate the same or corresponding parts.

Figure 4 shows splitted coil members 20a, 20b formed by splitting the coil member 20 at substantially the same proportion rate.

Figure 5 shows a state that the splitted coil member 20b is 180° reversed in the same plane where the splitted coils 20a, 20b in Figure 4 are placed.

Figure 6 shows a stator coil formed by overlapping the both splitted coils 20a, 20b as shown in Figure 5 so that the raising portion of the splitted coil 20a correspond to the sinking portions of the splitted coil 20b.

Figure 7 is a diagram showing a stator assembly 35 formed by inserting the stator coil as shown in Figure 6 in the slots 21 of the stator core 2.

The armature of the present invention is manufactured as follows.

First of all, a single phase coil unit 10 is formed by winding in a ring form the coil element 1 in a requisite number of turns. The coil unit 10 is subjected to a shaping operation by using a shaping machine (not shown) to form a star-like coil member 20 as shown in Figure 2. Then, the star-like coil member 20 is splitted into two splitted coils 20a, 20b in substantially the same proportion while the both splitted coils 20a, 20b are electrically connected. The splitted coil 20b is 180° reversed in the same plane as shown in Figure 5, and thereafter, the reversed coil 20b is overlaid on the splitted coil 20a so that each of the raised portions of the splitted coil 20b corresponds each of the sinking portions of the splitted coil 20a. Thus, a stator coil 40 as shown in Figure 6 is obtainable.

The stator coil 40 is subjected to regulation of shape so that inner and outer circles formed by coil ends have substantially same center. The shape regulating operation provides easy insertion of the stator coil 40 into the slots 21 of the stator core 2.

In order to form a three phase a.c. generator, the other two stator coils 40 are formed and inserted in the slots of the stator core 2 in the same manner as described above. Thus, the armature as shown in Figure 7 can be obtained.

Description has been made as to the coil member 20 formed in a star-shape and splitted into two parts. The splitted coils 20a, 20b may be formed by splitting a ringed coil unit 10 into two parts, which follow by forming the splitted ringed coil parts to have a star-shape so that each of the raising portions of one splitted part corresponds to each of the sinking portions of the other splitted part.

In the armature obtained by the present invention, about the portion of the coil elements of the stator coil, extending from the slots is divided into two parts, which are received in different slots. Accordingly, even when the stator coil is inserted in the slots at a high occupation rate, an inserting operations can be easy while the height of the coil ends can be reduced. Further, the coil ends can be effectively cooled.

Claims

1. An armature of an a.c. generator for a car comprising a stator core (2) provided with a number of slots (21) and stator coils fitted in said slots, **characterized** in that about a half in number of coil elements (20a,20b) of each radially extending portion of said stator coils received in said slots is received in the other slots.

2. A method of manufacturing an armature of an a.c. generator for a car, **characterized** in that a stator coil formed by shaping a coil element (10) in a multi-wound ring-shape, in which a number of raising and sinking portions are alternately formed in the radial direction; said stator coil is splitted into two multi-wound ring-shape stator coils (20a,20b) with electrical connection between them; either one of said two multi-wound ring-shape stator coils is 180° reversed; two splitted stator coils (20a,20b) are overlapped so that each of the raising portions of either of said splitted stator coils corresponds to each of the sinking portions of the other splitted stator coils; and said splitted stator coils are fitted into slots (21) formed in a stator core (2).

FIGURE 1

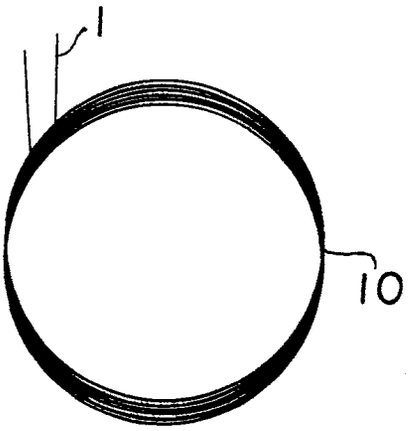

FIGURE 2

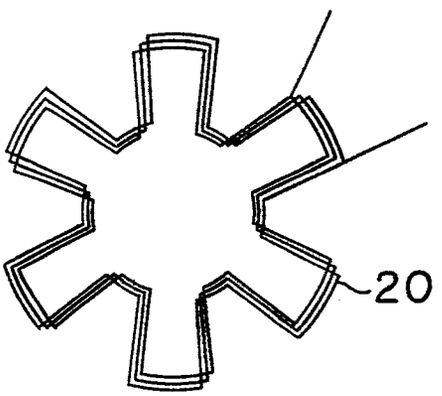

FIGURE 3

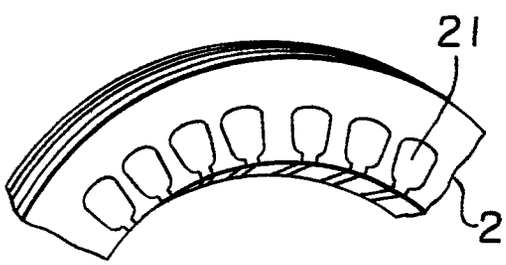

FIGURE 4

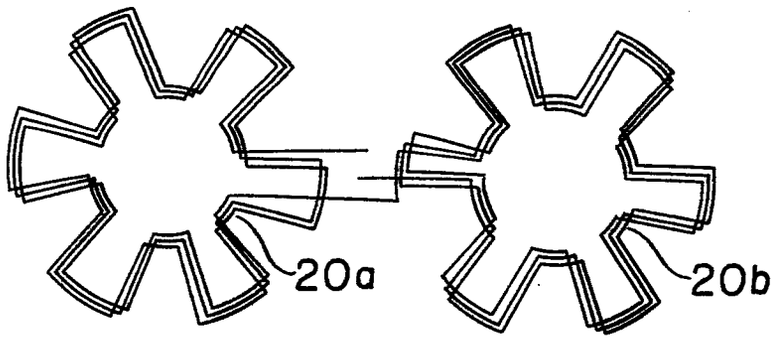

FIGURE 5

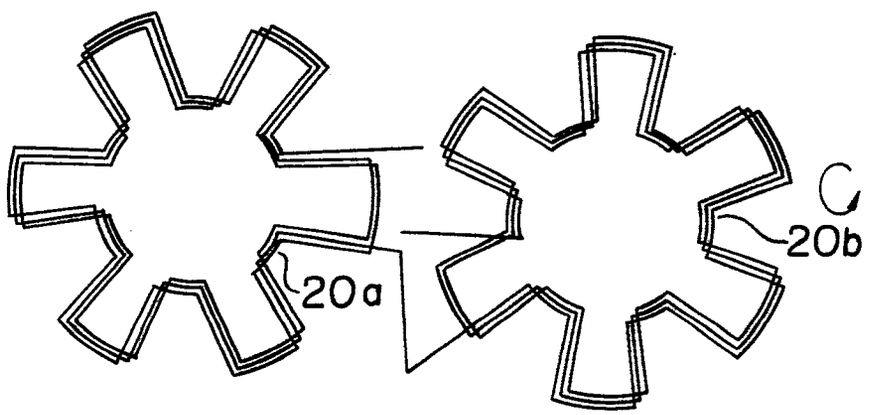

FIGURE 6

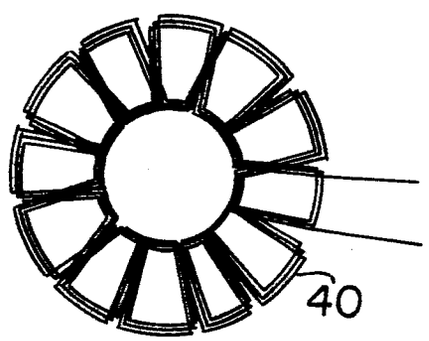

FIGURE 7

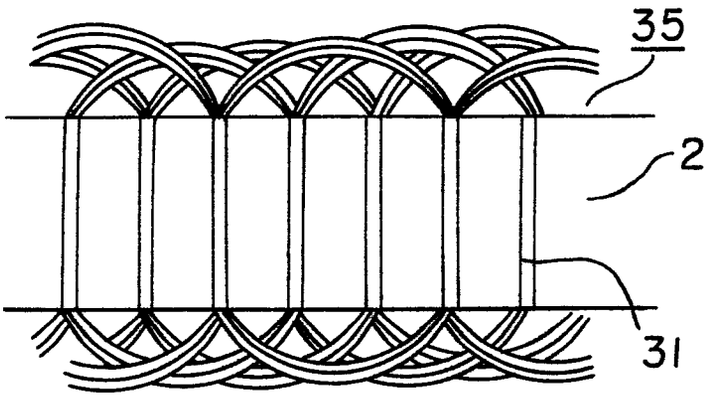

FIGURE 8